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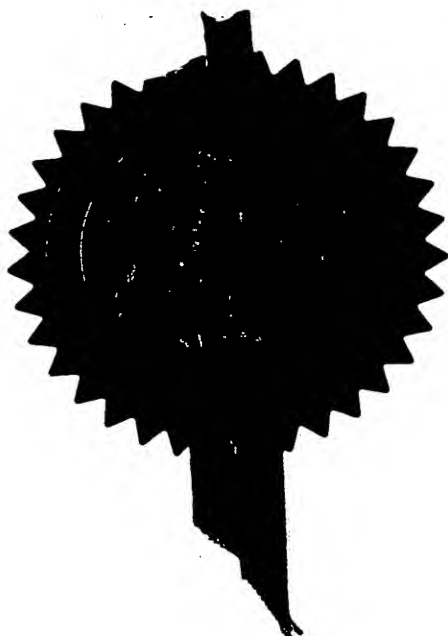
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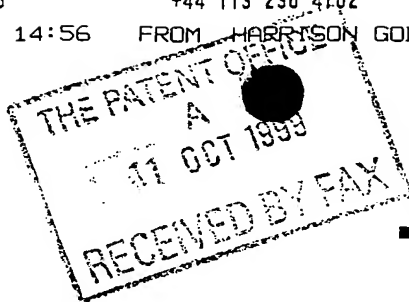
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FROM HARRISON GODDARD FOOTE

TO 01633814444

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Patents Form 1/77

**The  
Patent  
Office**11OCT99 5483077-2 002973  
POL/7700 0.00 - 9923959.2**Request for grant of a patent****The Patent Office**  
Cardiff Road  
Newport  
Gwent NP9 1RH

1	Your reference	MRH/P15832		
2	Patent application number	11 OCT 1999 <b>9923959.2</b>		
3	Full name, address and postcode of the applicant  Patents ADP number State of incorporation	Innovata Biomed Limited The Ziggurat Grosvenor Road ST ALBANS AL1 3HW  UK 4047130004 ✓		
4	Title of the invention	INHALER		
5	Name of agent Address for service  Patents ADP number	Harrison Goddard Foote  Belmont House 20 Wood Lane Headingley Leeds LS6 2AE  15571001 ✓		
6	Priority applications	Country	Priority App No	Date of Filing

Patents Form 1/77

Page 1 of 2

Patents Form 1/77

7	Parent application (eg Divisional)	Earlier Application No	Date of Filing
8	Statement of Inventorship Needed?		
9	Number of sheets for any of the following (not counting copies of same document)  Continuation sheets of this form Description Claims Abstract Drawings	3	
10	Number of other documents attached  Priority documents Translations of priority documents P7/77 P9/77 P10/77 Other documents		
11	I/We request the grant of a patent on the basis of this application.  Signature <u>Harrison Goddard Foote</u> Date 11 Oct 1999		
12	Name and daytime telephone number of person to contact in the United Kingdom  Michael R Harrison  +44 113 2258350		

## INHALER

### FIELD OF THE INVENTION

This invention relates to inhalers, which are devices for use in delivering a dose of  
5 medicament or other substance for inhaling into the lungs.

### BACKGROUND OF THE INVENTION

Inhalers make use of medicament in a finally divided powder form. The powder may  
be located within the inhaler, for instance, in a single storage compartment or in a  
10 plurality of single dose locations.

Another form of inhaler may make use of medicament powder which is located  
within a frangible, plastic capsule. In use, the capsule is inserted into the inhaler and  
operation of the inhaler ruptures from the plastic capsule so that the powder may be  
15 extracted from the capsule and inhaled by the user.

A problem encountered with all inhalers making use of powdered medicament is that,  
if moisture comes into contact with the powder, it will tend to make it less free-  
flowing and therefore render the operation of the inhaler less effective because the  
20 correct dose of powder cannot be fully inhaled.

Moisture may access the powder via several different mechanisms. These include the  
passage of the moisture through the plastic wall of encapsulated powder for those  
inhalers which make use of capsules loaded with medicament powder. For those  
25 inhalers which include a storage compartment loaded with powder and from which a  
dose of powder is accessed by some form of moving part within the inhaler and then  
presented to an air passageway for inhalation, moisture can access powder within the  
storage compartment by finding its way along a gap or gaps between the moving  
parts. In some inhalers there is the possibility of a "wick" type path being established  
30 between the powder in a storage compartment within the inhaler and a location  
within the inhaler where a dose of medicament is located.

With inhalers where a plurality of single doses of medicament is located within the inhaler, there is again likely to be one or more moving parts, providing gaps along which moisture may travel to access each individual dose of medicament.

It is also possible that moisture can pass through the plastic walls of inhalers and reach the powder contained within the inhaler whether in a single storage compartment or in individual dosage locations.

## 10 STATEMENTS OF INVENTION

The present invention provides an inhaler for delivering a substance in a finally divided form, the inhaler including a surface or surfaces provided with a moisture resistance coating.

15 The moisture resistance coating may be provided on one or more external or internal surfaces of the body of the inhaler. Particularly in the case of an inhaler making use of encapsulated powder, the moisture resistance coating may be applied to the outer and/or inner surface of the capsule, although other surfaces of the body of the inhaler may also be provided with a moisture resistant coating.

20 The moisture resistant coating may be in the form of any material which is effective to prevent moisture accessing the powder. Typically, it may be applied to those surfaces between which there may be a gap due to relative movement between the surfaces when the inhaler is in use. However, the moisture resistant coating may be  
25 applied additionally or alternatively to other surfaces including the whole or part of the external surface of the inhaler in order to prevent moisture passing into the interior of the inhaler through the walls thereof.

The moisture resisting coating should, of course be sufficiently stable and robust so  
30 that damage to the coating during use of the inhaler is avoided.

## DETAILED DESCRIPTION OF THE INVENTION

Moisture resistant coatings which may be used in the present invention may now be described, by way of examples only.

- 5 Polymers of poly-para-xylylenes are known as parylene. This material is a conformal polymer film which has been used in a number of applications, including electronics circuits and sensors, where environmental and dielectric isolation is required.

- 10 Parylenes are thermoplastic polymers that are capable of polymerising on surfaces from an active monomer gas, without the presence of a liquid. The process is capable of producing very thin layers of polymer and, indeed, a layer of from 10 to 20 microns may be sufficient to protect inhalers and their parts, from ingress of moisture.

- 15 The polymerisation process takes place at room temperature without solvents and additives. Since the parylene is applied as a gas it conforms to the topography of the surface which it contacts. Since the position does not involve a liquid phase, there is no pooling and bridging during application. The coating is free of pinholes even if the coating has a thickness of less than one micron. As well as being resistant again  
20 moisture, parylene is also resistant against other media including hydrocarbons, acids and blood.

The coating may be applied in a single vacuum-coating operation in a thickness from 0.025 to 75 microns and can be controlled accurately to  $\pm 10\%$  of the final thickness.